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RECORD OF ORAL HEARING

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHOJI HARA,
TAKASHI ITOH,
HITOSHI NOJIRI,
and MASARU NISHINAKA

Appeal 2009-003197
Application 09/782,169
Technology Center 1700

Oral Hearing Held: June 25, 2009

Before JEFFREY T. SMITH, MARK NAGUMO, and MICHAEL P. COLAIANNI, Administrative Patent Judges

ON BEHALF OF THE APPELLANT:

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The above-entitled matter came on for hearing on Thursday, June 25, 2009, commencing at 2:09 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia, before Victoria L. Wilson, Notary Public.

THE USHER: Calendar number 73. Mr. Adrian.

JUDGE SMITH: Welcome, Mr. Adrian.

MR. ADRIAN: Welcome. Good afternoon.

JUDGE SMITH: After you get yourself settled, you can begin. You have 20 minutes to present your arguments.

MR. ADRIAN: Thank you.

May it please the Board, we have brought this appeal today or requested the hearing to clarify some issues with our claimed invention and I will first summarize what the invention is and then go into the prior art and prior art rejections.

Our inventors have discovered a new process that can unexpectedly increase adhesion of a metal layer on a thermoplastic polyimide and they achieve this by -- it seems simple, simple to explain -- we directly form a conductor layer on a thermoplastic polyimide surface. Then we subsequently applied a heating step, optionally with pressure.

Here we found that the adhesion strength unexpectedly increased. In the prior art, in the past, there were -- it is known that there were a couple or many methods of laminating two layers.

One common one is with taking a copper foil, laminating it with a polyimide using heat and pressure. Another method which is known is to sputter or directly form your layer on the polyimide.

JUDGE NAGUMO: Let me go back to what you just said about

putting -- making a laminate by taking, like, a copper foil and putting it on. Why don't you have a laminate at that point?

When you heat it and press it, that's the second step, and so this claim reads on what you just described as being known in the prior art. What distinguishes --

MR. ADRIAN: I respectfully disagree. For example, if you look at our claim 1, we have -- and the language is important. We are forming at least one conductor layer directly adhering with at least one surface of a thermoplastic polyimide film.

JUDGE NAGUMO: So this is foil and this is polyimide and I form it on there?

MR. ADRIAN: Your foil is already formed.

JUDGE NAGUMO: No, that's not what the claim says. The claim says, "forming a conductive layer," I mean –

MR. ADRIAN: Directly adhering.

JUDGE NAGUMO: Where is the definition of "forming" in the specification --

MR. ADRIAN: Page –

JUDGE NAGUMO: -- limited to what you are saying?

MR. ADRIAN: Look at the detailed description, I think on page -- I notice the Examiner had commented in the Answer that there was no -- apparently no definition. Let's see.

JUDGE NAGUMO: I see plenty of examples, for example, but I don't see anything that speaks to what you have said.

MR. ADRIAN: Yes, it is page 7, that first sentence, detailed description of the invention. It says, "The laminate and polyimide,

according to the invention, are obtained by forming at least one conductor layer directly on the surface of a thermoplastic polyimide and thermally fusing the, thus, obtained laminate."

JUDGE NAGUMO: "Forming" is a very nebulous word, it seems to me, generally. It is –

MR. ADRIAN: Which –

JUDGE NAGUMO: "Forming."

MR. ADRIAN: Well, the art –

JUDGE NAGUMO: It is a very broad term and it doesn't – I mean "give form to," that's horribly broad. If I cut a piece of foil to fit a formed -- I mean that's how broad the term, it seems to me, is, and are you really -- is that where the crux of patentability comes, on "forming" in this case?

MR. ADRIAN: It is the direct forming of the layer. It is like being built up on the polyimide.

JUDGE NAGUMO: Well, I can understand a -- I think there is a claim that requires dry forming or something, sputtering.

MR. ADRIAN: Which we do have that.

JUDGE NAGUMO: But claim 1, which is the one that's principally been argued here, just has this term of "forming a conductor layer" and, as I said, it seems to me that if I do any sort of shaping at all to the -- to a conductive foil, and put it down onto a polyimide surface, then I have made a laminate.

MR. ADRIAN: I can understand.

JUDGE NAGUMO: And then if I heat it, as you say the prior art did, then it seems like I have -- I have conducted a process that reads -- that your claim reads on.

MR. ADRIAN: Okay. But I think you might be ignoring the prosecution history a little bit and where –

JUDGE NAGUMO: Well, the prosecution history doesn't have a whole lot of relevance to what the claim means –

MR. ADRIAN: Yes.

JUDGE NAGUMO: -- absent some demonstration that the specification or persons skilled in the art would read it and understand it to be limited in the way that you are suggesting.

MR. ADRIAN: I think a person of ordinary skill would read "forming" as directly –

JUDGE NAGUMO: And where is the evidence for that?

MR. ADRIAN: One of the prior art references that -- or if you look at the references that teach the sputtering, for example, one of them -- just one moment.

The Japanese 106, granted, I had printed out a machine translation from the JPO website, but their example that employed the electrolytic plating, they say a copper layer was formed by electrolytic plating on it.

All the other references that use foils or polyimide, they say, "applied," none of them use the term "forming" when you are dealing with foil.

So I respectfully submit that "forming" in the art means what we say it means, forming a layer, not a layer -- you know, a foil, having a foil, that foil is already formed and placed.

JUDGE NAGUMO: Was this particular issue discussed and resolved with the Examiner?

MR. ADRIAN: We had a long prosecution. Initially, our claims

started out with a little bit different language where I think we had "forming a conductor layer directly on."

At the time, the Examiner took the position that if you take a piece of foil and lay it on polyimide, that would be forming.

We disagreed at the time but we, to advance prosecution modified the language to make it so the heating step is distinct.

I think it was an Office Action May of 2005 where he had the position that you are mentioning right now of -- you know, he mentions it in the Examiner's Answer that in a prior office action, it was his position that during the foil lamination process, that at one point you would have a laminate and then the later heating would be considered the separate heating step that we recite in the claim.

So after that office action position, we amended the claims and he changed the rejection to apply another reference.

JUDGE NAGUMO: Okay. So if that isn't the -- if that's no longer an issue, then where is the error in the Examiner's rejection.

MR. ADRIAN: The error is the combination of the references. For example, the -- if you take his position, all he would have to do is apply Chen, 102B, or Shiotani, 102B, any foil laminating method and be an anticipation rejection.

JUDGE NAGUMO: Okay.

MR. ADRIAN: But that's not the way prosecution went.

JUDGE NAGUMO: And what's the error in Examiner's rejection, then?

MR. ADRIAN: Okay. Many. Many errors. The other error is the -- let's take the first art rejection. Chen, Shiotani and JP '966.

The Examiner had taken the position that the Japanese '966 reference -- well, first he makes a statement that the Chen and Shiotani references don't teach heating a laminate.

Well, they do. They don't teach the sputtering, forming the layer, followed by a subsequent heating step, as we claim. To try to remedy that deficiency, Japanese '966 was applied.

Now, this reference, if you look at its teachings, he applies it for a heat treatment and argues that that would make it obvious; one of ordinary skill in the art would expect success in increasing adhesion if you applied a heating -- subsequent heating step.

This Japanese reference, however, is quite different from the other two -- similar, in that, they take a foil, but different, in that, they apply a solution, a precursor, to polyimide to the foil and have a ripening step of -- to create the polyimide.

Well, what this reference actually teaches is that ripening step, there are some problems in that the adhesion is decreased.

JUDGE NAGUMO: Actually, when I read the reference, it tells me that if I do this in the open air, I lose strength but if I do it in a vacuum or under nitrogen -- I mean, even the abstract says do it under nitrogen without any losses of –

MR. ADRIAN: Right, no loss, but one thing it doesn't say is enhancing. It does not teach enhancing.

JUDGE NAGUMO: What conditions are distinct from the heating that this '966 reference –

MR. ADRIAN: Pardon?

JUDGE NAGUMO: What are the differences in conditions the '966

reference applies that would tell somebody that they are not going to enhance adhesion?

They don't have to know why it works, as long as they have a reason for doing this –

MR. ADRIAN: Well, the other –

JUDGE NAGUMO: -- and relaxing the polyimide so you don't get curl.

MR. ADRIAN: Right.

JUDGE NAGUMO: Seems like a pretty good reason. And if you incidentally get increase in adhesion, well, there you are.

MR. ADRIAN: Well, it is very different. Let me explain, please. That reference, you are applying to a metal layer, foil, solution, you are curing it, drying it, and then doing the ripening. That's much different from forming a metal or a conductor layer on a surface of an already formed thermoplastic polyimide.

JUDGE NAGUMO: But what is the difference in adhesion? I thought that's -- are we going back to this forming business because -- I thought –

MR. ADRIAN: It is more of a reason why would one of ordinary skill look to that reference and combine it with Chen and Shiotani who already have polyimide formed, or created, they have got polyimide and foil. This JP '966 reference is forming -- totally different process. You are taking a layer of –

JUDGE NAGUMO: As I read this reference, it tells you that they have got a thermoplastic polyimide and then they do this additional heating step.

MR. ADRIAN: The ripening.

JUDGE NAGUMO: The ripening.

MR. ADRIAN: At that point.

JUDGE NAGUMO: That is conducted at above room temperature, so it is heating, and what conditions of that ripening step are sufficiently different from what your claim requires?

MR. ADRIAN: Okay.

JUDGE NAGUMO: How does that -- how do you distinguish '966 from what the claim requires?

MR. ADRIAN: Okay. Again, forming a conductor layer directly adhering with at least one surface of a thermoplastic polyimide -- it is the matter of forming the conductor layer.

I think one thing that -- you know, the Examiner seems to take our word "forming" to mean forming the laminate. It is characterizing the conductor layer, forming at least one conductor layer, directly adhering.

JUDGE SMITH: Reading your claim language, I, first blush at reading this, forming at least one conductor layer directly adhering with at least one surface, seems like two steps to me.

I mean, just reading the claim, not going through your specification, reading the claim for what's there, it appears as though you are conforming a layer and then you are adhering it to a surface. But despite that language, what in that phrase excludes an adhesive?

MR. ADRIAN: Oh, an adhesive? It may not necessarily exclude an adhesive.

JUDGE SMITH: So that wouldn't exclude an adhesive useful for adhering the layer to the polyimide.

MR. ADRIAN: But -- well, the claim does require the adhering to one surface of a thermoplastic polyimide.

JUDGE SMITH: Right, with or without an adhesive.

MR. ADRIAN: That's -- I'm not sure if the claim language would exclude adhesive or not, necessarily.

I know that was, I think, kind of a position the Examiner was taking with our original "directly" language when we had it in the originally filed claims. We had the "forming directly on," and his interpretation was no adhesive there between.

We wanted to emphasize that it is the layer that is being built up on the surface of that thermoplastic polyimide. It is being formed at that time. And that's how, through the prosecution, that we arrived at this language.

JUDGE SMITH: Okay.

JUDGE NAGUMO: Let me try one more time on this issue with '966.

Is it your position that '966 -- that the rejection in combination with '966 doesn't work because '966 is working with a foil, whereas the other references are working with a sputtered or electro-deposited, or is it your position that '966 doesn't teach an increase in adhesion between the thermoplastic polyimide and the metal layer above it, regardless of how that metal layer got there?

MR. ADRIAN: Okay.

JUDGE NAGUMO: Which is it?

MR. ADRIAN: Okay. That's a lot. Which rejection are you referring to? The one with the U.S. patents in combination with the '966 or the one –

JUDGE NAGUMO: I'll take any one.

MR. ADRIAN: Because the ones with the U.S. patents, those employ foils, as well.

JUDGE NAGUMO: And so how do you distinguish for those '966 versus your adhesion step here, "heating said laminate"?

MR. ADRIAN: Okay. I'm not sure if I follow but all those reference, the first rejection, Chen, Shiotani, JP '966 all employ foils –

JUDGE NAGUMO: Okay.

MR. ADRIAN: -- where directly forming the layer. That's one distinction.

Second distinction: We changed the language to say that we are forming the laminate, you know, obtaining a laminate when the conductor is adhering to the polyimide, then subsequent heating to enhance adhesion.

So we have got two kind of steps of adhesive steps, you know, the first step when the conductors form, there is some adhesion there; second step, heating, positive -- positively recited separately as a heating step to that to enhance the adhesion as already obtained from the forming.

JUDGE NAGUMO: And why would one of ordinary skill in the art reading '966 not think that you would be enhancing the adhesion?

MR. ADRIAN: Well, plainly, its main example one, saying it is -- adhesion is decreased, okay, get rid of that.

JUDGE NAGUMO: That's because you did it in the open air and it teaches to do it in nitrogen to avoid that problem, so why –

MR. ADRIAN: Yes.

JUDGE NAGUMO: I'm asking what conditions of '966 teach one of ordinary skill in the art that you are not, in fact, meeting this last heating said laminate to increase –

MR. ADRIAN: Enhance.

JUDGE NAGUMO: -- so that the adhesion strength is enhanced? How am I to distinguish -- let's say I don't buy your forming argument, so that's out of the way.

MR. ADRIAN: Okay.

JUDGE NAGUMO: How do I distinguish '966? What facts do I find that allow me to say the Examiner erred because there is no evidence for enhanced adhesion?

MR. ADRIAN: Okay. I think I follow you. The position of -- okay. Just skipping that -- well, no positive teaching, so I guess you are trying to hint at a kind of inherency, it would be inherent that adhesion would be increased.

JUDGE NAGUMO: Evidently, that's what the Examiner thought.

MR. ADRIAN: Right but –

JUDGE NAGUMO: There is heating here.

MR. ADRIAN: Yes.

JUDGE NAGUMO: So how do I -- what finding do I make?

MR. ADRIAN: Well there is -- it could have the maximum adhesion already, just –

JUDGE NAGUMO: Could.

MR. ADRIAN: Could.

JUDGE NAGUMO: Could but -- you know.

MR. ADRIAN: I don't think the Examiner has met his burden that there is increased adhesion with that method, with this ripening step after the process -- process of forming that polyimide, you know, from a solution on a metal foil.

There may be, though, you know, a possibility of increased adhesion for that type of process. It is very distinct from when you have an already formed polyimide layer and you are forming a conductor layer on its surface.

JUDGE NAGUMO: I'm trying to isolate --

MR. ADRIAN: Yes, I understand.

JUDGE NAGUMO: -- the two arguments.

MR. ADRIAN: Right. Right.

JUDGE NAGUMO: Okay. I think I have your position. Thank you.

MR. ADRIAN: Yes.

Okay. As I think you are aware, we did argue separately numerous claims and we do have, you know, much more narrow claims that are specific to sputtering, which our position, we think the references clearly do not teach in the manner we claim.

I would like to, if possible -- how am I on time? Over?

JUDGE SMITH: You are over about five minutes.

MR. ADRIAN: I'm sorry. I would like to quickly, if I may, discuss the other combination of references, the Japanese references.

The JP '640, JP '106 with the JP '966, which we had a detailed discussion on just now. The Japanese '640 reference does have -- you know, make a distinction between the foil formation and lamination and the sputtering forming a conductor layer on polyimide.

They have a table which lists examples 1 through 9, the ones -- examples 1 through 8, I believe, are examples using foil where a subsequent heating step is performed.

Example 9, which uses the sputtering to form the layer, there is no heat or pressure applied.

Our position is that there would be no reason to combine the Japanese '966 reference with the Japanese '640. The '966 is the reference we just discussed, forming a polyimide on the metal foil and doing the ripening. No reason to look to that reference when you sputter your conductor layer.

Art teaches nothing about it. And especially in view of the possibility of decreased adhesion if it is performed in the atmosphere. Those are my main points. Thank you. Gentlemen, if you have any other questions, I would be happy to try to answer, but I appreciate your time.

JUDGE NAGUMO: No. Thank you.

JUDGE SMITH: Thank you for coming in. Your case has been submitted.

Whereupon, the proceedings at 2:35 p.m. were concluded.